

DETAILED ACTION

1. This Office Action is a response to the remarks filed on September 16, 2009. No claims have been amended; claims 3, 4 and 53-56 have been cancelled; claims 57-62 have been added.

2. Claims 39-51 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on September 16, 2009. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

3. Claims 1, 2, 5-38, 52, and 57-62 are active.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 2, 52, and 62 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "significantly" in claims 2 and 52 is a relative term which renders the claim indefinite. The term "significantly" is not defined by the claims, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim 62 recites the limitation "the atom transfer radical reaction process" in lines 2-3. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, 5-38, 52, and 57-62 are rejected under 35 U.S.C. 102(b) as being anticipated by Matyjaszewski et al. (EP 1 555 273 A1).

With regard to the limitations of claims 1, 2, 5-38, 52, and 57-62, Matyjaszewski discloses improved processes for atom (or group) transfer radical polymerization (ATRP) which involve polymerizing in the presence of a (partially) free radical-deactivating amount of the corresponding reduces or oxidized transition metal compound. In a further improvement the ATRP process involves polymerizing in homogeneous system in the presence of a solubilized initiating/catalytic system (abstract).

Matyjaszewski discloses a polymerization process comprising the process steps substantially identical as per instant claim 1: polymerizing one or more radically polymerizable monomers in the presence of initiating system comprising: an initiator having a radically transferable atom or group, a transition metal compound which participates in a reversible redox cycle (i.e., with the initiator), an amount of the redox conjugate of the transition metal compound sufficient to deactivate at least some initially-formed radicals, and any N-, O-, P- or S- containing ligand which coordinates in a σ -bond or any carbon-containing ligand which coordinates in a π -bond to the transition metal, or any carbon-containing bond with said monomer under the polymerizing conditions, to form a (co)polymer, and isolating the formed (co)polymer; and, in part, by novel (co)polymers prepared by atom (or group) radical transfer polymerization 1 (pages 5-6, [0042]).

The molar proportion of transition metal compound relative to initiator is generally that which is effective to polymerize the selected monomer(s), but may be from 0.0001:1 to 10:1, preferably from 0.1:1 to 5:1, more preferably from 0.3:1 to 2:1, and most preferably from 0.9:1 to 1.1:1. Conducting the polymerization in a homogeneous system may permit reducing the concentration of transition metal and ligand such that the molar proportion of transition metal compound to initiator is as low as 0.0001:1, which is clearly within the claimed ranges as per claims 1, 5-7, and 52 (page 16, [0110]).

Regarding the limitations of the reducing agents, suspending medium, the atom transfer radical polymerization initiator, etc. see the disclosures of Matyjaszewski et al.

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(pages 13-14, [0095]; Examples 30,33,34 ; page 9, [0070]-[0075]; page 16, [0116]-[0117]; page 18, [0129]; page 19, [0134]-[0136]; page 10, [0079]-[0082]; page 15, [0106]-[0109]; Figures).

6. Claims 1, 2, 5-38, 52, and 57-62 are rejected under 35 U.S.C. 102(b) as being anticipated by Matyjaszewski et al. (U.S. Patent 6,162,882).

With regard to the limitations of claims 1, 2, 5-38, 52, and 57-62, Matyjaszewski discloses a process of atom (or group) transfer radical polymerization for the synthesis of novel homopolymer or a block or graft copolymer, optionally containing at least one polar group, with well defined molecular architecture and narrow polydispersity index, in the presence of an initiating system comprising (i) an initiator having a radically transferable atom or group, (ii) a transition metal compound, and (iii) a ligand,

Matyjaszewski discloses the synthesis of a macromolecule having at least two halogen groups which can be used as a macroinitiator component (i) to subsequently form a block or graft copolymer by an atom or group transfer radical polymerization process, and a process of atom or group transfer radical polymerization for the synthesis of a branched or hyperbranched polymer (abstract). Another object is to provide a novel method for the synthesis of a macroinitiator for "living" radical polymerization and for the synthesis of a well defined block or graft copolymer where the macroinitiator constitutes at least one segment of the block copolymer (col. 5, lines 51-56). Accordingly, there is provided a method for atom (or group) transfer radical polymerization, encompassing the polymerization of a vinyl monomer in the presence of an initiating system, which includes: an initiator having a radically transferable atom or

group, a transition metal compound, and a ligand; the polymerization forms a macroinitiator of formula (I):



wherein each X is a halogen atom and n is an integer of 1 to 100; this macromonomer is then used in the presence of a vinyl monomer, a transition metal compound, and a ligand to form a block or graft copolymer, exhibiting a well defined molecular architecture (col. 6, lines 12-25).

Matyjaszewski discloses that the molar ratio of the components (i), (ii) and (iii) of the initiating system may range from 1/0.01/0.02 to 1/4/12, which is within the claimed range (col. 12, lines 49-51).

When a solvent is used, suitable solvents include ethers, cyclic ethers, alkyl esters, aryl esters, C₁–C₁₀ alkanes, C₅–C₈ cycloalkanes which may be substituted with from 1 to 3 C₁–C₄ alkyl groups, aromatic hydrocarbon solvents, halogenated hydrocarbon solvents, acetonitrile, dimethylformamide, mixtures of such solvents, and supercritical solvents (such as CO₂, C₁–C₄ alkanes in which any H may be replaced with F, etc.). The present polymerization may also be conducted in accordance with known suspension, emulsion and precipitation polymerization processes (col. 13, lines 1-12; col. 13, line 32 through col. 17, line 67).

The method for making a hyperbranched molecule is illustrated in scheme 5. the activation-deactivation process is shown in the first step and is assumed to occur throughout the polymerization. Activation occurs prior to addition of a monomer unit and deactivation after monomer addition (col. 20, line 30 through col. 21, line 57).

Any transition metal compound which can participate in a redox cycle with the initiator and dormant polymer chain, but which does not form a direct carbon-metal bond with the polymer chain, is suitable for use in the present invention. Preferred transition metal compounds are those of the formula $M_t^{n+}X_n'$, where: M_t^{n+} may be selected from the group consisting of Cu^{1+} , Cu^{2+} , Fe^{2+} , Fe^{3+} , etc. (col. 10, line 57 through col. 11, line 15).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL M. BERNSHTEYN whose telephone number is (571)272-2411. The examiner can normally be reached on M-Th 8-6:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu can be reached on 571-272-1114. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Michael M. Bernshteyn/
Examiner, Art Unit 1796

/M. M. B./
Examiner, Art Unit 1796

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D1 EP1555273 D2 US6162882 D3 US6538091 D4 US5945491

2. D1 is considered to disclose a polymerisation process comprising the process steps as described in the application claim 1.

The disclosures of D1 (page 5, line 46 - page 6, line 5 ; page 18, line 45 - page 19, line 6 ; page 16, line 1-5 "molar proportion of transition metal compound relative to initiator..." ; page 8, line 6-8 ; Examples 30,33,34 ; page 8, line 38 - page 9, line 27 ; page 13, line 42 - page 14, line 26 ; page 16, line 20-53 ; page 18, line 20-38 ; page 19, line 53 - page 20, line 29 ; Examples ; Figures ; page 9, line 37 - page 10, line 55 ; page 15, line 52-58), appear to be novelty-attacking for the subject-matter of the present claims 1-23 (Article 33(2) PCT).

The disclosures of D2 (claims 2,23,24 ; column 21, line 32-35 ; column 12, line 49-51 "the molar ratio..." ; examples ; column 13, line 32 - column 17, line 67 ; column 20, line 30 - column 21, line 57 ; column 10, line 56 - column 11, line 15 ; abstract ; column 5, line 51- 56 ; column 6, line 11-24 ; Figures), appear to be novelty-attacking for the subject-matter of the present claims 1-23 (Article 33(2) PCT)

The disclosures of D3 (abstract column 21, line 14 - 22 ; Examples 30-34 ; Figures ; Examples ; column 10, line 32-35 ; column 8, line 10 - column 37, line 52) ; and D4 (column 23, line 66 - column 24, line 8 ; column 14, line 10-12 ; claims 1,3,7,9,10,29,30,39-42 ; column 22, line 33 - column 24, line 25 ; examples ; abstract)